We claim:

1. A composition comprising:
   a) a substrate with a surface comprising discrete sites;
   b) a reflective coating on said surface; and
   c) a population of microspheres distributed on said substrate said microspheres comprising at least a first and a second subpopulation.

2. A composition according to claim 1 wherein at least one subpopulation comprises a bioactive agent.

3. A composition according to claim 1, wherein said substrate comprises a first and a second surface, wherein said first surface comprises said discrete sites, said reflective coating on said second surface, said population of microspheres distributed on said first surface.

4. A composition according to claim 1 or claim 3, wherein said substrate is a fiber optic bundle.

5. A composition according to claim 4, wherein said fiber optic bundle comprises wells comprising said microspheres.

6. A composition according to claim 1 or claim 3, wherein said substrate is selected from the group consisting of glass and plastic.

7. A composition according to claim 1 or claim 3, wherein said reflective coating is a metal.

8. A composition according to claim 7, wherein said metal is selected from the group consisting of gold, silver, chromium, platinum and indium tin oxide.

9. A composition according to claim 1 or claim 3 wherein said reflective coating is a dielectric coating.

10. A composition according to claim 1 or claim 3, wherein said reflective coating selectively absorbs certain wavelengths.

11. A method of making a reflective array comprising:
   a) providing a substrate with a surface comprising discrete sites:
   b) applying to said surface a coating of reflective material; and
   c) distributing microspheres on said surface.

12. A method according to claim 11 wherein said microspheres comprise a bioactive agent.

13. A method according to claim 11, wherein said substrate comprises a first and a second surface, wherein said first surface comprises discrete sites, said reflective material on said second surface and said microspheres distributed on said first surface.

14. A method comprising:

a) providing a pre-formed unitary fiber optic bundle comprising a proximal and a distal end, said distal end comprising plurality of discrete sites comprising a population of microspheres, said population comprising at least first and second subpopulations; and

c) imaging said fiber optic bundle from said distal end.

15. A method according to claim 14, wherein a reflective coating is present on said distal end of said fiber optic bundle.

16. A method according to claim 14, wherein a reflective coating is present on said proximal end of said fiber optic bundle.

17. An array composition comprising a substrate with a surface comprising discrete sites comprising alternatively shaped wells.

18. A composition according to claim 17, wherein the wall angle of said alternatively shaped wells is a sloped wall angle.

19. A composition according to claim 17, wherein said alternatively shaped wells contain a rounded wall interior.

20. A composition according to claim 17, wherein at least one of said alternatively shaped wells is a geometrically shaped well.

21. A composition according to claim 20, wherein said geometrically shaped well has a cross section selected from the group consisting of a square, a hexagon, a star, a triangle, a pentagon and an octagon.

22. A composition according to claim 17, further comprising a population of microspheres distributed in said wells.

23. A composition according to claim 22, wherein said population comprises at least first and second subpopulations, each of said subpopulations comprising a bioactive agent.

24. A composition according to claim 17, wherein said substrate is a transparent substrate comprising a first and a second surface, said first surface comprising discrete sites, and a reflective coating on said second surface.

25. A method comprising:

a) providing a substrate with a plurality of discrete sites, said sites comprising:

i) alternatively shaped wells; and

ii) a population of microspheres, said population comprising at least first and second subpopulations; and

b) imaging said substrate.

26. A method according to claim 25 wherein at least one of said subpopulations comprises a bioactive agent.

27. A method according to claim 25, wherein said alternatively shaped wells are geometrically shaped wells.

28. A method according to claim 27, wherein the cross section of said geometrically shaped wells is selected from the group consisting of a square, a hexagon, a star, a triangle, a pentagon and an octagon.

29. An array composition comprising:

a) a substrate with a surface comprising discrete sites; and

b) a population of microspheres distributed on said substrate, wherein said microspheres comprise:

i) a bioactive agent; and

ii) a signal transducer element.

30. A composition according to claim 29, wherein said signal transducer element is a nucleotide intercalator.

31. A composition according to claim 29, wherein said signal transducer element is a fluorophore.

32. A method of detecting a non-labeled target analyte in a sample comprising:

a) providing a substrate with a plurality of discrete sites;

b) distributing on said sites a population of microspheres comprising:

i) a bioactive agent;

ii) a signal transducer element;

c) contacting said substrate with said sample, whereby upon binding of said target analyte to said bioactive agent, a signal from signal transducer element is altered as an indication of the presence of said target analyte.

33. A method of detecting a chiral molecule in a sample comprising:

a) providing a substrate with a surface comprising:

i) at least first and second discrete sites; and

ii) at least first and second bioactive agents attached to said first and second discrete sites respectively;

b) contacting said substrate with said sample;

c) illuminating said substrate with polarized light; and

d) detecting rotation of said light in at least one of said first and second discrete sites as an indication of the presence of said chiral molecule.

34. A method according to claim 33, wherein said chiral molecule is DNA.

35. A method according to claim 33, wherein said first and second bioactive agents are chiral molecules.

36. A method according to claim 35, wherein said first and second bioactive agents are attached to said sites via first and second microspheres, respectively, said microspheres distributed at said sites.

37. A method of determining the location of a microsphere in an array comprising:

a) providing a substrate with a first surface comprising at least a first and a second discrete site, said first discrete site comprising a microsphere, said second discrete site not comprising a microsphere;

b) illuminating said substrate; and

c) detecting illumination of said substrate, whereby reduced illumination at said first discrete site relative to said second discrete site provides an indication of the presence of said first microsphere in said first discrete site.

38. A method according to claim 37, wherein said substrate is a fiber optic bundle and said discrete sties are wells, wherein said first surface is the distal end of the fiber optic bundle, and said detecting is with a detector at the proximal end of the fiber optic bundle.

39. A method of increasing signal output from an array, said method comprising

a) providing a substrate with a surface comprising:

i) at least first and second discrete sites; and

ii) at least first and second labels attached to said first and second discrete sites respectively;

b) cooling said substrate to at least below room temperature; and

c) detecting a signal from said first and second labels, whereby said signal is increased relative to a signal obtained from a substrate that is not cooled.

40. A method according to claim 39, wherein substrate is cooled to at least 0^0F.

41. A method for background signal subtraction in an array comprising:

a) providing a substrate with a surface comprising:

i) at least first and second discrete sites; and

ii) at least first and second labels attached to said first and second discrete sites respectively;

b) detecting the signal from said first and second discrete sites in a plurality of different emissions; and

c) subtracting the lowest signal from each of said first and second discrete sites from the remaining signals from said first and second discrete sites, respectively.

42. A method of correcting image non-uniformity comprising:

a) providing a substrate with a surface comprising:

i) at least first and second discrete sites;

ii) at least first and second labels attached to said first and second discrete sites respectively; and

iii) at least a first internal reference point of known signal intensity;

b) detecting a first and second signal from said first and second labels, respectively;

c) detecting a signal from said internal reference point; and

d) determining the variation between said signal from said internal reference point and the known signal intensity of said internal reference point as an indication of said image non-uniformity.

43. A method according to claim 42 further comprising:

e) correcting said first and second signal from said first and second labels, respectively, by an amount equal to the variation between said signal from said internal reference point and the known signal intensity of said internal reference point.

44. A method according to claim 42 wherein said first internal reference point is a microsphere distributed on a site.

45. A method according to claim 42, wherein said first and second labels are attached to said sites via first and second microspheres, respectively, said microspheres distributed at said sites.

46. A method according to claim 45, wherein each of said microspheres comprises an internal reference point of known signal intensity.